N. A. C. A. BULLETIN

Section I

Vol. VII, No. 17 May 1, 1926

Costs and Depreciation

By

CARL G. JENSEN
Comptroller, A. M. Byers Company,
Pittsburgh, Pa.

Published semi-monthly by the National Association of Cost Accountants, 130 West 42nd Street, New York. Subscription price, $15 per year. Entered at the Post Office, New York, N. Y., as second-class matter.

The National Association of Cost Accountants does not stand sponsor for views expressed by the writers of articles issued as Publications. The object of the Official Publications of the Association is to place before the members ideas which it is hoped may prove interesting and suggestive. The articles will cover a wide range of subjects and present many different viewpoints. It is not intended that they shall reflect the particular ideas of any individual or group. Constructive comments on any of the Publications will be welcome.

Additional copies of this Publication may be obtained from the office of the Secretary. The price to members is twenty-five cents per copy and to non-members seventy-five cents per copy.

COPYRIGHTED BY
NATIONAL ASSOCIATION OF
COST ACCOUNTANTS
MAY 1, 1926

Editorial Department Note

There are many aspects to the depreciation problem in its relation to accounting and management and it is of such importance as to claim the constant attention of all executives whose responsibilities relate either to costs or to plant management. Depreciation, as an economic phenomenon, is ever present. The best methods of determining its amount, of distributing it over product, and of financing replacements of depreciated properties are always pertinent questions. Our present Official Publication treats of some aspects of these questions in a new way and is worthy of serious thought.

The author is a man who has had broad experience in relation to the problems which he discusses. Mr. Carl G. Jensen was born on a farm in Wisconsin and after a high school and business college education worked for several years as bookkeeper, and later secretary-treasurer of a woodworking plant. He gave up this position to pursue further studies in the School of Commerce of the University of Wisconsin. After completing these studies he served for two years on the staff of Ernest Reckitt & Company, Certified Public Accountants of Chicago. He then spent three years with the Wisconsin State Board of Public Affairs installing cost systems in state departments and state institutions and assisting in the introduction of the state budget system; after which he went as comptroller with the A. M. Byers Company of Pittsburgh where he has been for eleven years. He is a C. P. A. of Wisconsin and Pennsylvania, and a member of the American Society of Certified Public Accountants. He is a member of the National Association of Cost Accountants and has been for three years a National Director of the Association. He is the author of Official Publication, Volume IV, Number 8, entitled "Cost Problems in the Wrought Iron Industry."

COSTS AND DEPRECIATION

Probably because I am known to have rather decided opinions on the subject of charging depreciation on cost values rather than on replacement values, I was asked to discuss "Costs and Depreciation" before this gathering tonight.

I fear my talk may seem a little rambling to you, but it gives me an opportunity to present these ideas for criticism to a trained group of cost accountants and, I hope, to discover whether or not there really is anything worth while in some of the ideas which I have gradually acquired through a considerable amount of study and practice of cost accounting and through being a good listener at eight annual and regional conventions of the N. A. C. A. and at several dozen chapter meetings.

At the very beginning of my talk, I want to raise the question as to what *cost* really is. Twenty odd years ago, when I first became interested in the subject of cost accounting, the definition seemed much more simple than it is today. Cost, as I understood it, represented the monetary value of materials and of services consumed in producing an article. Now we hear of so many kinds of costs that unless we are careful we may become confused. We

hear about historical costs, reproductive costs, standard costs, predetermined costs, budgetary costs, prophetic costs, unit costs, process costs, departmental costs, and many others. This multiplication of limiting phrases is due, of course, to the gradual recognition of the varying demands of different industries and of the different purposes for which costs are or may be used.

Sometimes it seems that speakers or writers become so enthusiastic as to give the impression that they believe one kind of cost can serve all industries and all purposes. Take, for instance, standard costs. Its strongest advocates sometimes give one the impression that, in accordance with their belief and contention, if we once have standard costs we have all we need. I offer no criticism of standard costs. On the contrary, I believe in them, but I believe we need all of the other kinds of costs, also. It seems to me that every large company needs many of these different kinds of costs.

Just now a favorite subject for discussion is management's use of costs. This is important for the management and for the cost accountant as well. I believe if the cost accountant is to give the best possible service, he should be prepared to furnish information on costs according to any of the above plans, whichever may be the most useful.

When we talk about the use of costs by management, we should define what we mean by management so that we can get on a common footing. I have heard discussions on this subject going on for some time before it was developed that to one side of the discussion management meant the works' manager and to the other it meant the board of directors. To some of you "management" is represented by the works' manager, to others by the President, to others by the owner, and to still others by their direct superiors, whatever their titles.

"Management" to me means the supervisory and directing groups from the board of directors down. Sometimes even the foremen would be included. Each of these groups will require different kinds of cost data grouped in different ways and furnished at different intervals.

For a number of years past my experience has been with the iron and steel business. I am, therefore, more familiar with this industry and will draw my illustrations from it.

We need historical costs to tell us what our profits are. If we charge materials into work in process at market instead of cost prices to get a check on the efficiency of our purchasing departments, we try to secure two different kinds of results with one operation. It seems to me that we do not succeed because to find our net profit or loss we must build up two separate profit and loss accounts. Why is it not as correct to charge your materials at cost and then, if necessary, make the secondary calculation to

show the efficiency of your purchasing department or your profit or loss in speculating in materials?

It strikes me that the greatest value of standard costs is to the operating department. It is a measuring stick to apply against actual performance, whereby we can get a line on operating efficiency, as a check on conversion costs within departments or within the plant as a whole. By standard costs, labor efficiency, waste, lost time, and other elements which are exceedingly important to the operating department, can be measured. But taken alone, standard costs cannot be used as a basis for selling prices unless material and labor can always be secured without price changes.

To set selling prices we need what may perhaps be called a "prophetic standard cost." When we set prices we have to develop a cost of this kind based on the best available estimates of future labor and material costs, standard operation conversion performances, and normal overhead.

In our business of making pipe we may, in this month, use ore contracted for a year ago. This ore may have been converted into pig iron six months ago. The pig iron may have been converted into muck bar perhaps four months ago, then the muck bar into skelp, and finally the skelp into pipe. If we ship pipe this month you will readily understand that the historical cost we apply has been accumulated over a period of nearly a year. We believe the difference between this cost and the selling price gives us our correct profit for the month. In developing this cost we incidentally develop departmental costs and unit costs by departments in as much detail as necessary. These costs can and are used by the operating department for comparison with standards and with past performance.

But if we were setting new selling prices today, these historical costs would not, for several reasons, be used as a proper basis. Some labor rates may change every 60 days, ore prices change every year and many other cost elements may change. Therefore, before setting selling prices we must develop an estimated future cost for each unit of output calculated on the following basis:

1. Future ore, coke and other material cost prices estimated as far ahead as possible.
2. Estimated future labor costs.
3. Estimated production requirements.
4. Standard conversion cost in each department.
5. Normal overhead.

You may call this incomplete, intermittent or periodical budgeting if you prefer.

As historical costs are developed, information is given to the management from the superintendent and his assistants to the president and directors. This information comes daily, weekly, monthly or when anything of special interest develops.

I have mentioned costs as being used for setting selling prices.

When I mention this I usually come up against the argument that competition, not costs, sets selling prices. The inference, therefore, usually is that it is useless to try to use costs for this purpose. I disagree with this viewpoint and contend that selling prices are primarily based on cost. The governing costs may be those of the leader in the industry or of the marginal producers, or they may be a sort of composite costs of all producers, but in the long run selling prices are based on costs arrived at in some manner even though such costs are only some sales manager's estimates.

Some of us may produce specialties with little or no competition and thus get better profits than producers in other lines where competition is keener. At all times, however, costs, plus profits or less losses, make selling prices. Even where competition is keen, cost is the basis for setting selling prices. As many of you know, there has been very little profit in recent years in producing soft coal, beehive coke or pig iron. How many of you have had to figure out carefully at what price you could sell pig iron without losing as much as you would lose by shutting down your blast furnace? We have done this many times and when we do we help to set selling prices.

We now come back to the question, "What is Cost?" and it seems that cost still is what it has always been, i. e., the measure in terms of dollars of the outlay necessary to purchase or produce.

Some of the elements entering into cost can be applied directly to the commodity or unit under production, while others require a considerable amount of apportioning. When you come to the matter of apportioning, you need experience, information and good judgment. On items to be apportioned, judgments differ and there develop opportunities for interesting discussions.

Probably the most difficult item to apportion is depreciation. You all know the definition of depreciation, but probably you have different ideas as to how you would apply depreciation to cost. I believe there are very few, if any, accountants who question that depreciation is an element of cost but they do differ on methods of charging it. In connection with depreciation, the principal problems, as I see them, are:

1. Rate of depreciation by (a) units of production, (b) departments, and (c) plants.

2. Distribution of depreciation (a) to departments, (b) to units of output.

3. At what percentage of plant or departmental operation should the full rate be applied, and what variations should be allowed when operations are below normal.

4. How can we make our book depreciation accounts agree with the depreciation allowed us by the Internal Revenue Department.

Some accountants and others have, during the last few years, been discussing whether they ought not to depreciate on the basis of replacement value instead of cost values. This question does

not bother me at all. I have yet to hear what to me is a convincing argument in favor of charging depreciation into cost on replacement values. I will touch more on this point later.

The question as to whether or not depreciation is an element of cost seems to me to admit of no argument. In producing or manufacturing, we have direct labor which we can apply to the product without difficulty. We have indirect labor which we apportion, we have supervisory and miscellaneous labor which we allocate. We have direct material wholly consumed and easily calculated. We have direct material and supplies less easily applied, but which can be apportioned with a reasonable degree of accuracy. When we consider tools and supplies which can be used for a number of operations, we do not question their being cost elements.

In our business, puddlers tool iron may last for several days instead of being consumed in direct conversion as is the case with the pig iron. Pipe balls may last for two to eight operations before being useless and even then, if of the larger sizes, may be ground down to serve for the next smaller size. We do not question that pipe balls are an item in the cost of making pipe.

The roof or walls of a pipe furnace may last from six months to a year and the lining of a blast furnace from a few weeks to three or four years. These items are direct costs of making pipe or pig iron, as much as the ore, limestone and coke used in the blast furnace or the skelp used in the pipe furnace.

If the outlay for the lining or roof of a furnace is cost, why not the outlay for the furnace itself, which may last eight to fourteen years for a pipe furnace and twenty to thirty years for a blast furnace, if obsolescence does not intervene to shorten the period.

In iron and steel mills the lining and repairing of furnaces are recognized as cost elements, but some producers stop at that point. The wear of the furnace as a whole is not considered a cost element and the same applies to buildings, machinery, and other units of longer life used for production.

I believe that, in any given operation, the exhaustion, wear and tear on the furnace, building, machinery, etc., is as much an element of cost as the expenditure for shorter lived items. The difference is a matter of degree only. This exhaustion or wear and tear is what we call depreciation. It is much more difficult to measure than the exhaustion, wear and tear of the shorter lived elements, and perhaps largely for that reason has been omitted in so many costs calculations.

Depreciation is recognized as an element of cost not only by accountants but by the Internal Revenue Department, by the courts, by the United States and State Utility Commissions, etc., so why not apply it as an element in our costs? The principal difficulty is to determine the amount of depreciation, and how to charge it into costs.

First, you will need values. Uusally your books will permit you to find plant costs, not only by plants, but by departments and by producing units. If your books do not supply the necessary data you may have an appraisal made by competent appraisers. Then you need rates. There are numerous sources from which these can be secured. Rates published by utility commissions, trade associations, etc., are often available. Your own engineering and operating departments in co-operation may be able to give you fair or good estimates of the life of different units. The manufacturers may be able to supply data and competent appraisal companies will gladly supply you with rates.

The company with which I am associated is an old company and some years ago when we decided to charge depreciation directly into production costs, our books did not give the necessary information as to details of plant cost. Fortunately, we did have a detailed appraisal at 1913 values which represented cost values to the company. This had been made by a competent appraisal company. For a comparatively reasonable expenditure we had this same appraisal company furnish us composite depreciation rates by departments, by individual units or by classes of equipment. With this information before us the calculation and charging of depreciation to operating or production units was simple. We believe the wear and tear on our blast furnace is a cost of producing pig iron, that the wear and tear on our puddle mills is a cost of producing muck bar and so on down the line. Depreciation charged by production departments or units is built into the cost through the various operations, so that when the final completed cost is arrived at there is no question of applying depreciation as general overhead or as a charge to profit and loss and there are no disputes with sales managers who might attempt to have such items of cost eliminated when competition grows keen.

Furthermore, we believe that we develop correct costs for each process which are available for comparison with materials of a similar grade, if purchase is considered. Also the departments requiring the largest investment of capital directly reflect the cost of this greater investment in their production costs.

In compiling process costs the departmental charge for depreciation is automatically allocated to units of production through our regular procedure. Our pig iron and muck bar costs illustrate this method.

For skelp, pipe welding, and pipe finishing, we have to apply the depreciation charge to units of production in much the same manner as we do our departmental or operating burden. This may be on the basis of furnace hour, machine hour, man hour, etc.

For distribution of the depreciation charge based on percentage of operation we have developed our practice on the following basis. First we determine the theoretical capacity of each operating department. Second, we assume that practical capacity is 75% of theoretical capacity. Third, we have decided that if

operations in any department equal or exceed 75% of practical capacity, full depreciation will be charged. If operations are at a rate less than 75% of practical capacity some adjustments in the charge are made.

We have two rates of depreciation for each department or class of equipment. These rates were furnished by the appraisal company. The first is a net rate which is the estimated rate of depreciation over and above any possible replacement or maintenance and measures the depreciation which will take place even if the plant is idle. The second rate is a gross rate and includes the first, or net rate, plus the added percentage necessary to take care of replacements and wear and tear from use. These rates take into account the normal hours of operation of each department, i. e., a department operating 24 hours per day would take a higher rate than one operating 10 hours.

The full net rate is charged to each department even if idle. The full gross rate is only charged if operations are at 75% of practical capacity. If operations are at 37½% of practical capacity, we charge the net rate plus one-half of the difference between the gross and net rates.

We do not claim perfection for our plan but we do claim that it is workable and practical in our industry, and we will use it until we learn of a better method.

As to the best method of having books agree with the rates allowed by the Internal Revenue Department, I cannot give any suggestion.

Now for the basis, on which to apply depreciation rates—cost or replacement—I will enumerate some of my reasons for believing in the cost basis:

1. Depreciation is recognized as a method of recovering or replacing funds used in capital investment by the time property representing the investment is worn out or valueless.

But it is replacement of funds about which we are concerned and not the creation of new funds for future investment, not replacement of physical units.

2. Advocates of the replacement basis always seem to argue from the standpoint of replacement values being higher than original cost values. Therefore, they desire a return through cost of a larger sum than they invested in order to replace physical units rather than dollars. Their arguments are heard most often in periods of rising costs.

But replacement costs could also easily be lower than investment cost, i. e., if a plant were constructed during the war or shortly after. I have not seen any plan worked out for a case of this kind.

3. What producer would ever desire a physical replacement of his plant? I claim none of them would. Most plants can be expected to last 20 years. Can you think of any plant owner who, if he lost a 20-year old plant, would want to replace it with one

exactly like the old? He might want a new plant, but not a duplicate of the old. He would want changes in size, in design, and perhaps in purpose and location.

If he does not desire a replacement, I contend that he should ask no more than to have his investment returned. If he then, in building his new plant, wishes to increase or decrease his investment, he will have to make a new start with either increased or decreased investment and from then on depreciate on the basis of his new cost.

4. The replacement basis does not seem to me to be practical. The replacement or reproduction cost changes every time there is a change in labor rates, in freight rates, in taxes, or in the cost of any one of the hundred of items entering into the cost of a plant.

If you try to keep up to date with your replacement costs, you may find yourself in the position of the chameleon who was placed on a piece of scotch plaid and died trying to make good.

If you change your books on January 1 to agree with market rates, by July, you may be farther away than if you had stuck to cost.

5. Any plant passes through several periods of rising or falling prices. Therefore, when it is ready to scrap, the original cost may be as near to current replacement cost as any average of yearly revaluations.

6. Depreciation in a plant such as ours represents only about four to six percent of the total cost of material produced. This is not a large enough proportion of the total, when taken alone, to put us entirely out of line in competition.

If newer plants represent higher investment than older plants, they should also be more modern and efficient and therefore and thereby more than offset the comparatively slight handicap of higher depreciation.

7. Who would do this constant revaluing of your plant? You would undoubtedly have to employ a force of trained engineers or to have the constant services of an appraisal company at a considerable cost.

8. If your plant were to be revalued each year (I am assuming that even the advocates of the reproductive method would not change oftener than this) your property accounts would be very active accounts and afford little opportunity for comparisons of any value from year to year.

9. If you charge depreciation on replacement values you are singling out one comparatively small element of cost to be handled in a different way from your other elements. You charge leases, insurance, salaries, labor, etc., into cost at the price, in dollars, you paid for them not at a price you might have to pay at some distant day in the future.

10. Depreciation has well been called a "guesstimate," but on a cost basis we at least have the one known and fixed factor of original cost. The rate only has to be estimated. The advocates

of the replacement basis would have us work out our problem with two unknown and no known factors.

I do not by any means object to provision being made for replacement of plants at an estimated higher future cost, if the management of the company believes costs will be higher when replacement becomes necessary.

The management has a choice of different ways of accomplishing this purpose. 1. It can conserve profits for this purpose through reserves or through the surplus account. 2. It can endeavor to secure a higher rate of profit and conserve such profit in a separate reserve. 3. But this extra profit should be called by its proper name and not called "cost."

I do not believe we should endeavor to have our depreciation and cost accounts take over the functions of management. These records should, as far as possible, deal with facts and leave the larger questions of policy which require executive judgment to the executives who are charged with this responsibility.

Cost accounts and statistics can record facts, conditions and even probabilities, but they cannot take the place of good business judgment.